Semiconductor Nanomaterials | 7879f4b73e8e04dcbb2e566d6683f5b

Spectroscopic Characterization of III-V Semiconductor Nanomaterials

Semiconductor Nanomaterials: Characterization, Properties, and Applications

This book introduces the wider field of functional nanomaterials sciences, with a strong emphasis on semiconductor photonics. Whether you are studying photonic quantum devices or just interested in semiconductor nanomaterials and their benefits for optoelectronic applications, this book offers a pedagogical overview of the relevant subjects along with topical reviews. The book discusses different yet complementary studies in the context of ongoing international research efforts, delivering examples from both fundamental and applied research to a broad readership. Science and engineering professionals in the interdisciplinary domains of nanotechnology, photonics, materials sciences, and quantum physics can familiarize themselves with selected highlights with eyes towards photonic applications in the fields of two-dimensional materials research, light-matter interactions, and quantum technologies.

Optical Properties and Spectroscopy of Nanomaterials

Nanostructures and Nanomaterials

The must-have ten-volume successor to the critically acclaimed Nanotechnologies for the Life Sciences series, Nanostructures and Nanomaterials for Water Treatment and Remediation provides an excellent, in-depth overview of all nanomaterial types and their uses in the life sciences. Each volume is dedicated to a specific material class and covers fundamental, synthesis strategies, structure-property relationships, material behavior fine-tuning, biological effects, and applications in the life sciences. This landmark set provides materials scientists, chemists, biologists, molecular biologists, clinical physicists, physiological chemists, medicinal chemists, and toxicologists with essential awareness of life science applications.

Electron Transfer in Nanomaterials

This text focuses on the synthesis, properties and applications of nanostructures and nanomaterials, particularly inorganic nanomaterials. It provides coverage of the fundamentals and processing techniques with regard to synthesis, properties, characterization and applications of nanostructures and nanomaterials.
Nanomaterials

Nanomaterials for Direct Alcohol Fuel Cells

UV–VIS and Photoluminescence Spectroscopy for Nanomaterials Characterization

While the chemistry, physics, and optical properties of simple atoms and molecules are quite well understood, this book demonstrates that there is much to be learned about the optics of nanomaterials. Through comparative analysis of the size-dependent optical response from nanomaterials, it is shown that although strides have been made in computational chemistry and physics, bridging length scales from nano to macro remains a major challenge. Organic, molecular, polymer, and biological systems are shown to be potentially useful models for assembly. Our progress in understanding the optical properties of biological nanomaterials is important driving force for a variety of applications.

Metal Semiconductor Core–shell Nanostructures for Energy and Environmental Applications

Advances in Polymer Science enjoys a longstanding tradition and good reputation in its community. Each volume is dedicated to a current topic, and each review critically surveys one aspect of that topic, to place it within the context of the volume. The volumes typically summarize the significant developments of the last 5 to 10 years and discuss them critically, presenting selected examples, explaining and illustrating the important principles, and bringing together many important references of primary literature. On that basis, future research directions in the area can be discussed. Advances in Polymer Science volumes thus are important references for every polymer scientist, as well as for other scientists interested in polymer science - as an introduction to a neighboring field, or as a compilation of detailed information for the specialist.

Nanomaterials for Water Treatment and Remediation

Handbook of Nanomaterials for Wastewater Treatment: Fundamentals and Scale up Issues provides coverage of the nanomaterials used for wastewater treatment, covering photocatalytic nanocomposite materials, nanomaterials used in wastewater treatment adsorbents, water remediation processes, and their current status and challenges. The book explores the major applications of nanomaterials for effective catalysis and adsorption, also providing in-depth information on the properties and application of new advanced nanomaterials for wastewater treatment processes. This is an important reference source for researchers who need to solve basic and advanced problems relating to the use of nanomaterials for the development of wastewater treatment processes and technologies. As nanotechnology has the potential to substantially improve current water and wastewater treatment processes, the synthesis methods and physiochemical properties of nanomaterials and noble metal nanoparticles make their performance and mechanisms efficient for the treatment of various pollutants. Explains the properties of the most commonly used nanomaterials used for wastewater treatment Describes the major nanoscale synthesis and processing techniques for wastewater treatment\nAssesses the major challenges for using nanomaterials on a mass scale for wastewater treatment

Characterization of Nanomaterials

The main aims of this book are to summarize the fundamentals, synthesis methods, properties and applications of nanomaterials, so as to provide readers with a systematic knowledge on nanomaterials. In addition, the book covers most commonly used characterization tools pertaining to nanomaterials. Further, it deals with relevant aspects of nanocomposites which contains dispersion of nano-sized particulates, and carbon nanotubes (CNTs) in the matrices (polymer, metal and ceramic). It also discusses development of smart nano textiles (intelligent textiles), self-cleaning glass, sensors, actuators, ferro-fluids, and wear resistant nano coatings. Aimed at senior undergraduate and graduate students, the key features on this book include: Top-down and bottom-up approaches for the synthesis of nanomaterials included Illustrates sample preparation and basic principle of characterization tools for nanomaterials Explains calculation of ratios of surface area to volume and surface atoms to bulk atoms Reviews synthesis, properties and applications of carbon nanotubes and magnetic nanomaterials Discusses size effect on thermal, mechanical, optical, magnetic and electrical properties

Nanostructures & Nanomaterials

After the drug discovery and development process, designing suitable formulations to safely deliver the optimum dose, while avoiding side effects, has been a constant challenge, especially when drugs are very toxic and have poor solubility and undesirable clearance profiles. With recent advances in synthetic technologies, nanoparticles can be custom-made from a variety of advanced materials to mimic the bioenvironment and can be equipped with various targeting and imaging moieties for site-specific delivery and real-time imaging. Drug Delivery Using Nanomaterials covers advancements in the field of nanoparticle-based drug-delivery systems, along with all the aspects needed for a successful and marketable nanoformulation. FEATURES Offers a general overview of the entire process involved in the synthesis and characterization of pharmaceutical nanoparticles Covers a broad range of synthetic materials for developing nanoformulations customized for specific disease states, target organs, and drugs Every chapter sequentially builds, providing a progressive pathway from classical nanoparticles to the more advanced to be used as a full drug product by consumers Provides information in a bottom-up manner in that definitions and explanations of relevant background information serve as a framework for understanding advanced concepts This user-friendly reference is aimed at materials engineers, chemical engineers, biomedical engineers, pharmaceutical scientists, chemists, and others working on advanced drug delivery, from academia as well as industry.
Nanomaterials

Optics of Nanomaterials

Connecting inorganic chemistry to the hottest topic in materials science, this timely resource collects the contributions made by leading inorganic chemists towards nanomaterials research. The second volume in the “Wiley Encyclopedia of Inorganic Chemistry Methods and Applications Series,” this signature title concentrates on recent developments in the field and includes all key topics such as nanowires, nanotubes, biomineralization, supramolecular materials and much more. This volume is also available as part of Encyclopedia of Inorganic Chemistry, 5 Volume Set. This set combines all volumes published as ETC Books from 2007 to 2010, representing areas of key developments in the field of inorganic chemistry published in the Encyclopedia of Inorganic Chemistry. Find out more.

Drug Delivery Using Nanomaterials

The book “Nanomaterials” includes all aspects of metal-oxide nano-structures, nano-composites, and polymer materials instigating with materials survey and preparations, growth and characterizations, processing and fabrications, developments and potential applications. These topics have utilized innovative methods of preparation, improvement, and continuous changes in multidimensional ways. The innovative frontiers are branching out from time to time to advanced nanotechnology. It is an important booklet for scientific organizations, governmental research-centers, academic libraries, and the overall research and development of nano-materials in general. It has been created for widespread audience with diverse backgrounds and education.

Mixed Metal Nanomaterials

This important book focuses on the synthesis and fabrication of nanostructures and nanomaterials, but also includes properties and applications of nanostructures and nanomaterials, particularly inorganic nanomaterials. It provides balanced and comprehensive coverage of the fundamentals and processing techniques with regard to synthesis, characterization, properties, and applications of nanostructures and nanomaterials. Both chemical processing and lithographic techniques are presented in a systematic and coherent manner for the synthesis and fabrication of 0-D, 1-D, and 2-D nanostructures, as well as special nanomaterials such as carbon nanotubes and ordered mesoporous oxides. The book will serve as a general introduction to nanomaterials and nanotechnology for teaching and self-study purposes.

Semiconductor Nanomaterials for Flexible Technologies

The use of microwaves has gradually democratized itself in several scientific areas and is now a common methodology in domains as different as chemistry, protein digestion, mining, and metallurgy. Materials chemistry is one field where microwave irradiation technologies are being studied. In recent years, development of nanotechnologies has increased the interest of materials scientists in these new technologies. Microwave methodologies are now routinely used in several areas of materials science, and new advances are ongoing. This book presents recent improvements in microwave engineering of materials and nanomaterials, interactions of microwave chemistry with materials, and advances in microwave technologies in several domains such as polymer synthesis and modification, processing of various materials (ceramics, glasses, metallic alloys, zeolites), and synthesis and functionalization of diverse nanomaterials (carbon nanotubes, MOF semiconductors, inorganic nanoparticles). The book will be of interest to all students and researchers in materials science and nanosciences who want to discover or increase their knowledge of microwave technology.

Toxicity of Nanomaterials

Advanced Rare Earth-Based Ceramic Nanomaterials focuses on recent advances related to preparation methods and applications of advanced rare earth-based ceramic nanomaterials. Different approaches for synthesizing rare earth-based ceramic nanomaterials are discussed, along with their advantages and disadvantages for applications in various fields. Sections cover rare earth-based ceramic nanomaterials like ceria and rare earth oxides (RE2O3), rare earth vanadates, rare earth titanates, rare earth zirconates, rare earth stannates, rare earth-based tungstates, rare earth-based manganese, ferrites, cobaltites, nickelates, rare earth doped semiconductor nanomaterials, rare earth molybdates, rare earth-based nanocomposites, rare earth-based compounds for solar cells, and laser nanomaterials based on rare-earth compounds. Reviews the chemistry and processing of rare earth doped ceramic nanomaterials and their characteristics and applications. Covers a broad range of materials, including ceria and rare earth oxides (RE2O3), vanadates, titanates, zirconates, stannates, tungstates, manganites, ferrites, cobaltites, nickelates, rare earth doped semiconductor nanomaterials, rare earth molybdates, rare earth-based nanocomposites, rare earth-based compounds for solar cells, and laser nanomaterials based on rare-earth compounds. Includes different approaches to synthesizing each family of rare earth-based ceramic nanomaterials, along with their advantages and disadvantages. Provides green chemistry-based methods for the preparation of advanced rare earth-based ceramic nanomaterials.

Semiconductor Nanomaterials

Nanomaterials for Direct Alcohol Fuel Cells explains nanomaterials and nanocomposites as well as the technology, manufacturing, and design of alcohol fuel cell applications. The advantages of direct alcohol fuel cells (DAFCs) are significant for reliable and long-lasting portable power sources used in devices such as mobile phones and computers. Even though substantial improvements have been made in DAFC systems over the last decade, more effort is needed to commercialize DAFCs by producing durable, low-cost, and smaller-sized devices. Nanomaterials have an important role to play in achieving this aim. The use of nanotechnology in DAFCs is vital due to their role in the synthesis of nanocatalysts within the manufacturing process. Lately, nanocatalysts containing carbon such as graphene, carbon nanotubes, and carbon nanocoils
have also attracted much attention. When compared to traditional materials, carbon-based materials have unique advantages, such as high corrosion resistance, better electrical conductivity, and less catalyst poisoning. This book also covers different aspects of nanocomposites fabrication, including their preparation, design, and characterization techniques for their fuel cell applications. This book is an important reference source for materials scientists, engineers, energy scientists, and electrochemists who are seeking to improve their understanding of how nanomaterials are being used to enhance the efficiency and lower the cost of DAFCs. Shows how nanomaterials are being used for the design and manufacture of DAFCs. Explores how nanotechnology is being used to enhance the synthesis and catalysis processes to create the next generation of fuel cells. Assesses the major challenges of producing nanomaterial-based DAFCs on an industrial scale.

**Electrochemistry of Nanomaterials**

Semiconductor nanocrystals and metal nanoparticles are the building blocks of the next generation of electronic, optoelectronic, and photonic devices. Covering this rapidly developing and interdisciplinary field, the book examines in detail the physical properties and device applications of semiconductor nanocrystals and metal nanoparticles. It begins with a review of the synthesis and characterization of various semiconductor nanocrystals and metal nanoparticles and goes on to discuss in detail their optical, light emission, and electrical properties. It then illustrates some exciting applications of nanoelectronic devices (memristors and single-electron devices) and optoelectronic devices (UV detectors, quantum dot lasers, and solar cells), as well as other applications (gas sensors and metallic nanopastes for power electronics packaging). Focuses on a new class of materials that exhibit fascinating physical properties and have many exciting device applications. Presents an overview of synthesis strategies and characterization techniques for various semiconductor nanocrystal and metal nanoparticles. Examines in detail the optical/optoelectronic properties, light emission properties, and electrical properties of semiconductor nanocrystals and metal nanoparticles. Reviews applications in nanoelectronic devices, optoelectronic devices, and photonic devices.

**Handbook of Nanomaterials for Wastewater Treatment**

**Nanomaterials for Drug Delivery and Therapy**

Offering a comprehensive view of water-treatment technologies, Nanomaterials for Water Treatment and Remediation explores recent developments in the use of advanced nanomaterials (ANMs) for water treatment and remediation. In-depth reaction mechanisms in water-treatment technologies, including adsorption, catalysis, and membrane filtration for water purification using ANMs, are discussed in detail. The book includes an investigation of the fabrication processes of nanostructured materials and the fundamental aspects of surfaces at the nanoscale. The book also covers the removal of water-borne pathogens and microbes through a photochemical approach. FEATURES Explains various chemical treatments for the removal and separation of hazardous dyes, organic pollutants, pharmaceuticals, and heavy metals from aqueous solutions, including adsorption, advanced oxidation process, and photocatalysis Discusses the rational design of nanoporous materials with a tunable pore structure and fabrication of nanomaterials by surface chemistry engineering Covers the role of nanomaterials-assisted oxidation and reduction processes, design of nano-assisted membrane-based separation, and multifunctional nanomaterials and nanodevices for water treatment Provides an understanding of the structure-activity relationship and stability of ANMs under critical experimental conditions Identifies potential challenges in the application of multifunctional ANMs for future research Nanomaterials for Water Treatment and Remediation is aimed at researchers and industry professionals in chemical, materials, and environmental engineering as well as related fields interested in the application of advanced materials to water treatment and remediation.

**Nanomaterials and Nanocomposites**

Introducing the fields of nanomaterials and devices, and their applications across a wide range of academic disciplines and industry sectors, Donglu Shi bridges knowledge acquisition and practical work, providing a starting point for the research and development of applications. The book describes characterization of nanomaterials, their preparation methods and performance testing techniques; the design and development of nano-scale devices; and the applications of nanomaterials, with examples taken from different industry sectors, such as lighting, energy, bioengineering and medicine / medical devices. Key nanomaterial types are covered, such as carbon nanotubes, nanobiomaterials, nano-magnetic materials, semiconductor materials and nanocomposites. Shi also provides detailed coverage of key emerging technologies such as DNA nanotechnology and spintronics. The resulting text is equally relevant for advanced students (senior and graduate) and for engineers and scientists from a variety of different academic backgrounds and interests in the multi-disciplinary field of nanotechnology. Provides detailed guidance for the characterization of nanomaterials, their preparation, and performance testing Explains the principles and challenges of the design and development of nano-scale devices Explores applications through cases taken from a range of different sectors, including electronics, energy and medicine.

**Carbon Nanomaterials**

The study of nanostructures has become, in recent years, a theme common to many disciplines, in which scientists and engineers manipulate matter at the atomic and molecular level in order to obtain materials and systems with significantly improved properties. Carbon nanomaterials have a unique place in nanoscience owing to their exceptional thermal, electrical, chemical, and mechanical properties, finding application in areas as diverse as super strong composite materials, energy storage and conversion, supercapacitors, smart sensors, targeted drug delivery, paints, and nanoelectronics. This book is the first to cover a broad spectrum of carbon nanomaterials, namely carbon nanofibers, vapor-grown carbon fibers, different forms of amorphous nanocarbons besides carbon nanotubes, fullerenes, graphene, graphene nanoribbons, graphene quantum dots, etc. in a single volume.
Organic-Inorganic Hybrid Nanomaterials

This book addresses the fabrication of responsive functional nanomaterials and their use in sustainable energy and environmental applications. Responsive functional nanomaterials can change their physicochemical properties to adapt to their environment. Accordingly, these novel materials are playing an increasingly important role in a diverse range of applications, such as sensors and actuators, self-healing materials, separation, drug delivery, diagnostics, tissue engineering, functional coatings and textiles. This book reports on the latest advances in responsive functional nanomaterials in a wide range of applications and will appeal to a broad readership across the fields of materials, chemistry, sustainable energy, environmental science and nanotechnology.

Semiconductor Photonics of Nanomaterials and Quantum Structures

Green nanomaterials are classified as nanomaterials with no environmentally harmful, toxic, properties. The photocatalysis of nanomaterials involves photo-conduction value in efficient removal/degradation of noxious pollutants. Green nanotechnology has objectives for the development of products and processes which are environmentally friendly, economically sustainable, safe, energy-efficient, and produce little waste or emissions. Such products and processes are based on renewable materials and/or have a low net impact on the environment. Green functionalized nanomaterials, formed by a combination of nanomaterials with natural materials or are derived through a green source, are the new trends in the remediation of pollutants in environmental industries. This has the effect of making photoactive nanomaterials work under UV/sunlight radiation in order to produce reactive radical species that rapidly remove pollutants by redox mechanism. Green Functionalized Nanomaterials for Environmental Applications focuses on recent developments in the area of fabrication of green nanomaterials and their properties. It also looks at ways of lowering the risk of exposure of green functionalized nanomaterials. This needs to be pursued in the future for investigating and assessing health risks, which may be due to exposure to green nanomaterials. It is an important reference source for all those seeking to improve their understanding of how green functionalized nanomaterials are being used in a range of environmental applications, as well as considering potential toxicity implications. Highlights innovative industrial technologies for green functionalized nanomaterials Covers major fabrication techniques for sustainable functionalized nanomaterials Shows how sustainable functionalized nanomaterials are being developed for commercial applications

Synthesis and Characterization of Semiconductor Nanomaterials

The Series The new book series "Nanomaterials for the Life Sciences," successor to the highly acclaimed series "Nanotechnology for the Life Sciences," provides an in-depth overview of all nanomaterial types and their uses in the life sciences. Each volume is dedicated to a specific material class and covers fundamentals, synthesis and characterization strategies, structure-property relationships and biomedical applications. The new series brings nanomaterials to the life scientists. The new series brings nanomaterials to the life scientists. Thus, the books are a rich source for all those seeking to improve their understanding of how green functionalized nanomaterials are being used in a range of environmental applications, as well as considering potential toxicity implications. Highlights innovative industrial technologies for green functionalized nanomaterials Covers major fabrication techniques for sustainable functionalized nanomaterials Shows how sustainable functionalized nanomaterials are being developed for commercial applications

Microwave Engineering of Nanomaterials

Hydrogen Materials Science and Chemistry of Carbon Nanomaterials

This new book focuses on recent developments in this field, focusing on nanostructured materials and nanocomposites. The book deals with some recent developments in the synthesis and characterization of nanomaterial as well as its incorporation into polymer matrices. The biological applications of nanomaterials are also discussed in detail, along with new approaches in nanostructured materials and nanocomposites. Highlights include a detailed discussion on synthesis of nanostructured materials and nanocomposites; reviews of biodiesel production; green nanostructured materials; and nanosensors, nanomedicines, and biomedical applications of nanostructured materials.

Nanomaterials

This book considers the various advanced hydrogen materials and technologies of their synthesis. It presents the consideration of the physics, chemistry, thermodynamics and kinetics of processes of energy conversion, which occur at hydrogen production, storage, transportation and with its use. It also discusses the pioneering attempts to transform motor transport, airplanes, domestic technics, illumination and industrial manufacture of hydrogen fuel.

Semiconductor Nanocrystals and Metal Nanoparticles

Nanostructured materials, especially, 1D, 2D and 3D nanostructures, and their engineered architectures are being increasingly used due to their potential to achieve sustainable development in energy and environmental sectors, providing a solution to a range of global challenges. A huge amount of research has been devoted in the recent past on the fine-tuning of nano-architectures to accomplish innovations in energy storage and conversions, i.e., batteries, supercapacitors, fuel cells, solar cells, and electrochromic devices, bifunctional catalysts for ORR and OER, gas to fuels, liquid to fuels, and photocatalysts, corrosion,
Green Functionalized Nanomaterials for Environmental Applications

Choice Recommended Title, April 2020 This comprehensive book, edited by two leading experts in nanotechnology and bioengineering with contributions from a global team of specialists, provides a detailed overview of the environmental and health impacts associated with the toxicology of nanomaterials. Special attention is given to nanomaterial toxicity during synthesis, production and application, and chapters throughout are focused on key areas that are important for future research and development of nanomaterials. This book will be of interest to advanced students studying biomedical engineering and materials science, PhD researchers, post-docs and academics working in the area of nanotechnology, medicine, manufacturing and regulatory bodies.

Nanomaterials for Sustainable Energy and Environmental Remediation

The first in-depth treatment of the synthesis, processing, and characterization of nanomaterials using lasers, ranging from fundamentals to the latest research results, this handy reference is divided into two main sections. In the first, nanomaterials, nanoarchitectures and laser-matter interactions in the first three chapters, the book goes on to discuss the synthesis of various nanomaterials in vacuum, gas and liquids. The second half discusses various nanomaterial characterization techniques involving lasers, from Raman and photoluminescence spectroscopies to light dynamic scattering, laser spectroscopy and such unusual techniques as laser photo acoustic, fluorescence correlation spectroscopy, ultrafast dynamics and laser-induced thermal pulses. The specialist authors adopt a practical approach throughout, with an emphasis on experiments, set-up, and results. Each chapter begins with an introduction and is uniform in covering the basic approaches, experimental setups, and dependencies of the particular method on different parameters, providing sufficient theory and modeling to understand the principles behind the techniques.

Nanomaterials for Biosensors

This volume combines the chemistry and materials science of nanomaterials and biomolecules with their detection strategies, sensor physics and device engineering. In so doing, it covers the important types of nanomaterials for biosensor applications, namely nanotubes, nanowires and nanoparticles, dendrimers, and nanostructured silicon. It also illustrates a wide range of sensing principles, including fluorescence, nanocantilever oscillators, electrochemical detection, antibody-antigen interactions, and magnetic detection.

Advanced Nanomaterials for Photothermal Agents

Engineering of nanophase materials and devices is of vital interest in electronics, semiconductors and optics, catalysis, ceramics and magnetism. Research associated with nanoparticles has widely spread and diffused into every field of scientific research, forming a trend of nanocrystal engineered materials. Electrochemical methods are widely used for the preparation of nanoparticles and the electrochemical properties of such nanomaterials are most relevant for their applications. This comprehensive reference work will appeal to advanced graduate students and researchers in the field specialized in electrochemistry, materials physics and materials science.

Lanthanide-Doped Luminescent Nanomaterials

Metal Semiconductor Core-Shell Nanostructures for Energy and Environmental Applications provides a concise, scholarly overview of current research into the characterisation of metal semiconductor core-shell nanostructures; the book shows how their properties can be best used in energy and environmental applications, particularly for solar cell and catalysis application. Coverage is also given to the effect of metal nanoparticle for charge generation or charge separation. The book is a valuable resource for academic researchers working in the areas of nanotechnology, sustainable energy and chemical engineering, and is also of great use to engineers working in photovoltaic and pollution industries. Includes a clear method for synthesis of core-shell nanomaterials. Explores how metal semiconductor core-shell nanostructures can be used to improve the efficiency of solar cells. Explains how the characteristics of metal semiconductor core-shell nanostructures make them particularly useful for sustainable energy and environmental applications.

Advanced Rare Earth-Based Ceramic Nanomaterials

Characterization of Nanomaterials: Advances and Key Technologies discusses the latest advancements in the synthesis of various types of nanomaterials. The book’s main objective is to provide a comprehensive review of the latest developments in energy and environmental remediation in a comprehensive manner. Experimental studies of various nanomaterials will be discussed along with their design and applications, with specific attention to various chemical reactions involving and their challenges for catalysis, energy storage and conversion systems, and removal of pollutants are addressed. This book will also emphasize the challenges with past developments and direction for further research, details pertaining to the current ground-breaking technology and future perspective with a multidisciplinary approach on energy, nanobiotechnology and environmental science. Summarizes the latest advances in how nanotechnology is being used in energy and environmental science. Outlines the major challenges to using nanomaterials for creating new products and devices in the sustainable energy and environmental sectors. Helps materials scientists and engineers make selection and design decisions regarding which nanomaterial to use when creating new products and evices for energy and environmental applications.
regarding the latest advances in synthesis protocols that includes up-to-date data records on the synthesis of all kinds of inorganic nanostructures using various physical and chemical methods. The synthesis of all important nanomaterials, such as carbon nanostructures, Core-shell Quantum dots, Metal and metal oxide nanostructures, Nanoferrites, polymer nanostructures, nanofibers, and smart nanomaterials are discussed, making this a one-stop reference resource on research accomplishments in this area. Leading researchers from industry, academia, government and private research institutions across the globe have contributed to the book. Academics, researchers, scientists, engineers and students working in the field of polymer nanocomposites will benefit from its solutions for material problems. Provides an up-to-date data record on the synthesis of all kinds of organic and inorganic nanostructures using various physical and chemical methods Presents the latest advances in synthesis protocols Presents latest techniques used in the physical and chemical characterization of nanomaterials Covers characterization of all the important materials groups such as: carbon nanostructures, core-shell quantum dots, metal and metal oxide nanostructures, nanoferrites, polymer nanostructures and nanofibers A broad range of applications is covered including the performance of batteries, solar cells, water filtration, catalysts, electronics, drug delivery, tissue engineering, food packaging, sensors and fuel cells Leading researchers from industry, academia, government and private research institutes have contributed to the books

**Nanomaterials and Devices**

Lanthanide-Doped Luminescent Nanomaterials reviews the latest advances in the development of lanthanide-doped luminescent inorganic nanoparticles for potential bioapplications. This book covers the chemical and physical fundamentals of these nanoparticles, such as the controlled synthesis methodology, surface modification chemistry, optical physics, and their promising applications in diverse bioassays, with an emphasis on heterogeneous and homogeneous in-vitro biodetection of tumor biomarkers. This book is intended for those readers who are interested in systematically understanding the materials design strategy, optical behavior of lanthanide ions, and practical bioapplications of lanthanide nanoparticles. It primarily focuses on the interdisciplinary frontiers in chemistry, physics and biological aspects of luminescent nanomaterials. All chapters were written by scientists active in this field and for a broad audience, providing both beginners and advanced researchers with comprehensive information on the subject. Xueyuan Chen is a Professor at Fujian Institute of Research on the Structure of Matter (FJIRSM), Chinese Academy of Sciences. Yongsheng Liu is a Research Associate Professor at FJIRSM, Chinese Academy of Sciences. Datao Tu is a Research Assistant Professor at FJIRSM, Chinese Academy of Sciences.

**Responsive Nanomaterials for Sustainable Applications**

This book is an overview of the strategies to generate high-quality films of one-dimensional semiconductor nanostructures on flexible substrates (e.g., plastics) and the use of them as building blocks to fabricating flexible devices (including electronics, optoelectronics, sensors, power systems). In addition to engineering aspects, the physics and chemistry behind the fabrication and device operation will also be discussed as well. Internationally recognized scientists from academia, national laboratories, and industries, who are the leading researchers in the emerging areas, are contributing exceptional chapters according to their cutting-edge research results and expertise. This book will be an on-time addition to the literature in nanoscience and engineering. It will be suitable for graduate students and researchers as a useful reference to stimulate their research interest as well as facilitate their research in nanoscience and engineering. Considers the physics and chemistry behind fabrication and device operation Discusses applications to electronics, optoelectronics, sensors and power systems Examines existing technologies and investigates emerging trends

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